

British Isles. It was first recorded in this country from the Birmingham district by Lowndes (1931 a).

Cytherissa lacustris G. O. Sars.—One specimen was obtained from mud dredged from about 60 metres. The species has not been recorded from the Lake District before.

In conclusion, I should like to thank Mr. A. G. Lowndes for examining specimens of *Pseudocandona elongata* for me and for his advice.

REFERENCES.

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- (2) KAUFMANN, A. 1900. "Cypriden und Darwinuliden der Schweiz." Revue Suisse de Zoologie, vol. viii. p. 389.
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- (5) LOWNDES, A. G. 1935. "The Sperms of Freshwater Ostracods." Proc. Zool. Soc. London, pp. 35–48.
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XLI.—*Some new Ephemeroptera*. By D. E. KIMMINS
Department of Entomology, British Museum (Natural History).

[Plate XI.]

THE examples, upon which are based the descriptions of four of the new species in this paper, formed part of a collection bequeathed to the British Museum by the late Rev. A. E. Eaton. With a few exceptions the specimens were collected in the Khasi* Hills district of Assam, but without further indication either of date or of collector. Many of them have suffered from the ravages of time and psocids, etc., but fortunately most species were represented by series of examples. After describing these four species, there remains a residue of females and subimagines which, in the absence of

* The specimens bear the label "Khasia Hills," but I am using the modified spelling given in the Imperial Gazetteer of India, 1931.

males, I have decided to leave unnamed. The subsequent identification of a species described from the female sex only is in many cases a matter of great difficulty and uncertainty, and is liable to cause much confusion.

Unless otherwise stated, all the following species are described from dried pinned material. The figures of the male genitalia have been made from examples which have been cleared in KOH, and before mounting in Canada balsam. The relative lengths of the tarsal segments were measured with an eyepiece micrometer, the segments attached to the tibia being quoted first.

Ephemerella zettana, sp. n. . (Pl. XI. fig. 1 ; text-fig. 1.)

Subimago (preserved in formalin).—Wings light warm sepia-grey, longitudinal veins pale, cross-veins brown, bordered with purplish brown. Pronotum sepia-brown, disc of mesonotum whitish, with a dark brown, sagittate patch occupying the anterior half ; lateral margins of notum jet-black, whitish posteriorly. Abdomen bright reddish brown.

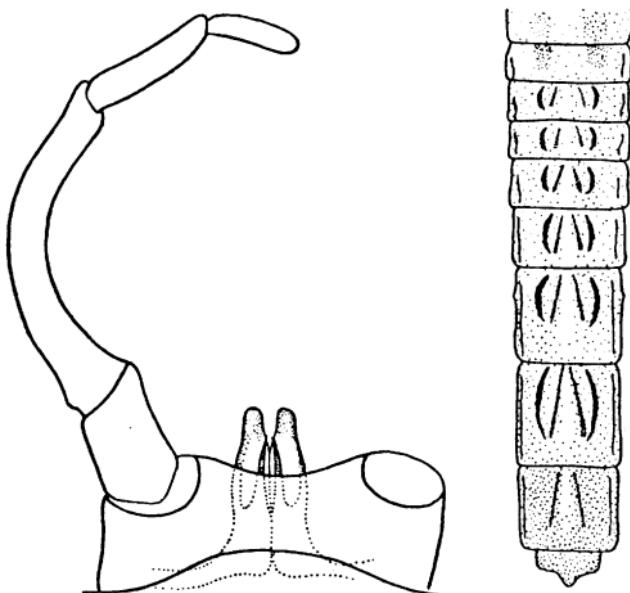
Imago ♂ (in formalin).—Eyes purplish black. Thorax above dark brown, pronotum sepia-brown. Anterior legs reddish or yellowish brown, tips of the femora and of the tarsal segments blackish. Median and posterior legs whitish, marked with blackish brown on the coxae, trochanters, bases and apices of femora, bases of tibiæ, and tips of tarsal segments.

Abdomen reddish brown, darker apically, and paler beneath, marked with brownish-black. The dorsal markings (text-fig. 1) on segments 1-2 are obscure, on 3-8 a divergent streak on each side of the dorsal vessel, and outside each streak a lunate spot of about the same length ($\frac{1}{2}$ to $\frac{3}{4}$ of the length of the segment), and a sinuous line near each lateral margin. Segment 9 without the lunate spots, 10 unmarked. Segments 2-8 ventrally with a pair of streaks, bent inwards at right-angles at their bases. Forceps base (text-fig. 1) brownish, forceps whitish or yellowish, faintly shaded with brown. Third and fourth segments together more than half the length of the second. Lobes of the penis of the usual *Ephemerella* type, scarcely differing from those of *E. danica* Müll. Setæ yellowish, with darker annulations.

Wings (Pl. XI. fig. 1) throughout brownish hyaline, veins and cross-veins dark brown and bordered with dark brown. The costal and subcostal areas of front wing are of a darker shade than the remainder of the wing, and there is a dark streak at the level of the bulla, and a spot between the branches of the cubitus, towards the base of the wing. Apical and posterior margin of the hind wing broadly margined with brown.

♀ similar, the membrane of the wings paler, thus throwing the venation into greater contrast. Abdomen brighter red-brown than the ♂.

Fig. 1.



Ephemera zettana, sp. n. ♂.

Genitalia from beneath, and diagram of abdominal markings.

Length of body, ♂ 16, ♀ 22 mm.; wing, ♂ 17-18, ♀ 21-22 mm.

MONTENEGRO, R. Zetta, 1933 (*A. H. Batten Poole*).

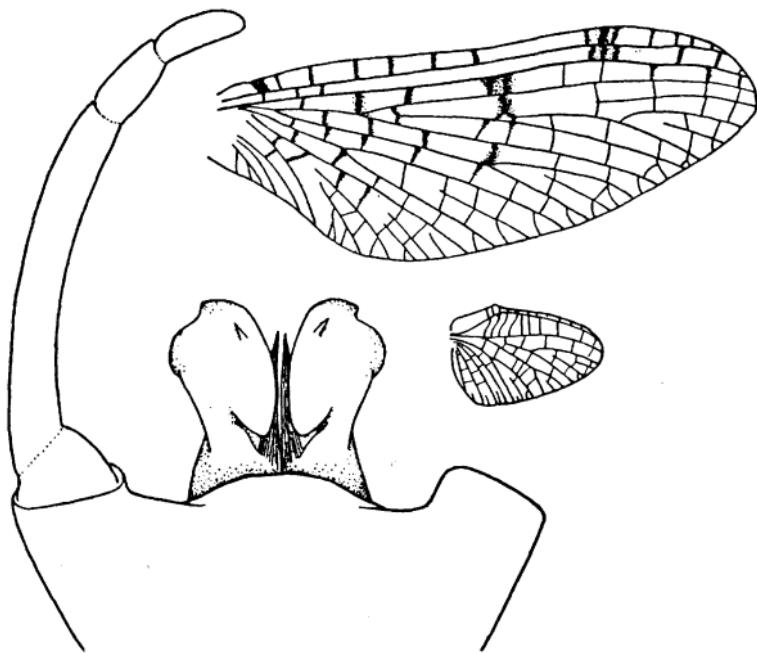
Type ♂, paratypes ♂♀ in the British Museum (Natural History), kindly presented by the collector.

The most noticeable feature of this species is the bright reddish-brown colour of the abdomen. The specimens have been stored in 2 per cent. formaldehyde for about two years and the colour still persists. In answer to an enquiry whether the colour of the insect had been

affected by the collecting-fluid, Mr. Batten Poole writes :—
 “ The mayflies start with an olive brown body, but as the season advances, this assumes a reddish tinge, while the spent Gnat has an entirely crimson body.”

The pattern of the abdominal markings recalls that of *glaucoptera*, but the greater size, colour of the abdomen and wings, and proportions of the segments of the forceps of *E. zettana* should separate it from *glaucoptera*. From *E. danica*, which it resembles in the proportions of the forceps, it may be separated by the colour and pattern of the abdomen.

Fig. 2.

*Afronurus njalensis*, sp. n. ♂.

Genitalia from beneath, and wings.

Afronurus njalensis, sp. n. (Fig. 2.)

♂.—Turbinate eyes black. Thorax piceous, marked laterally with pale yellowish. Legs pale, banded with blackish at midway and apex of femur, and near the base, midway, and at apex of tibia. Tarsus of anterior leg slightly longer than tibia, segments in proportions 7, 10, 10, 6, 5. Hind tarsus three-fifths as long as tibia, segments in proportions 4, 3, 3, 2, 3. Abdominal segments 2–8 pale yellowish above, marked with piceous, as follows :—A median and two lateral longitudinal stripes,

extending the whole length of each segment, and joined to a transverse apical band. This band is expanded at the posterior lateral angles and, together with one of the lateral stripes and a triangular patch on the anterior margin, encloses a yellowish mark in the form of a 7. Tergites 9–10 largely piceous. Sternites 1–6 pale, with a triangular piceous spot in each anterior lateral angle, 7–9, largely piceous. Forceps-base dark, forceps whitish (text-fig. 2). Setæ whitish, joints of alternate segments black. Lobes of the penis rounded, shallowly excised apically, and each bearing a small spine. No teeth on the forceps-base, which is produced at the centre of its margin in a broad rounded lobe. Wings hyaline, marked with brown (text-fig. 2). In the hind wing *Rs* separates from *R* further from the base than in *A. harrisoni* Barnard.

♀.—Resembling the ♂, but body somewhat paler, wings more strongly marked. Ventral plate rounded, entire.

	mm.	mm.
Length of anterior wing	δ 9,	φ 10
„ body	δ 9,	φ 9
„ setæ	δ 19,	φ 17

Type ♂, Sierra Leone, Njala, 9. xi. 30 (*E. Hargreaves*) ; ♂♀ paratypes, Njala, x–xi. 30, x. 31, iii. 32, ix. 32, iii. 34 (*E. Hargreaves*) ; 1 ♂, Uganda, Rogem, 21. ix. 33 (*G. H. E. Hopkins*).

Type and paratypes in the British Museum of Natural History, presented by the Imperial Institute of Entomology.

I think that on some future occasion it may be necessary to erect a new genus for this species as it differs in several respects from Lestage's diagnosis of *Afronurus*. For instance, the ♂ anterior tarsus is slightly longer than the tibia, not $\frac{1}{3}$ shorter; the hind tarsus is $\frac{1}{5}$, not $\frac{1}{2}$ shorter than the tibia. The lobes of the penis are formed after the pattern of *Heptagenia*, but *A. njalensis* differs from that genus in the proportions of the tarsal segments of both anterior and posterior legs. At present, however, as there are so few representatives of the family Ecdyonuridae known from Africa, I am unwilling to add to the number of genera.

CINYGMINA, gen. nov.

♂.—First segment of the anterior tarsus $\frac{1}{2}$ of the length of the second, which is longer than the third. Anterior tarsus $1\frac{1}{2}$ times as long as tibia. First segment of posterior tarsus longer than second. No forked cross-veins in pterostigma of anterior wing. Lobes of the penis rounded apically, not dilated laterally as in *Ecdyonurus*; genital stimuli much reduced, represented by a pair of small, thin, chitinous plates. Venation of the usual Heptagenine type.

Genotype : *C. assamensis*, sp. n.

This genus appears to be most closely related to *Cinygma* Eaton, from which it is distinguished by the different proportions of the ♂ anterior tarsal segments, the relative lengths of the anterior tarsus and tibia, and the greater reduction of the genital stimuli. According to Mr. McDunnough's figure of the genitalia of *Cinygma integrum* Eaton (the genotype) in Canad. Ent. 1926, lviii. pl. iii. fig. 10, the stimuli are shown as small spines, whereas in the present genus they are reduced to thin chitinous plates. From *Ecdyonurus* it may be separated by the form of the penis lobes, and the reduction of the stimuli; from *Epeorus* and *Iron* by the proportions of the anterior tarsal segments of the ♂, and from *Heptagenia* by the relative lengths of the posterior tarsal segments.

Cinygmina assamensis, sp. n. (Fig. 3.)

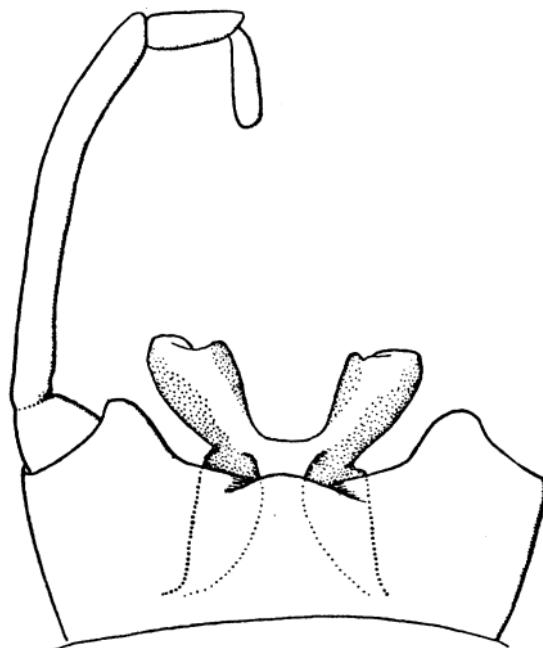
Subimago ♂.—Wings pale greyish cream, costal and apical margins of anterior wing shaded with darker grey. Veins almost colourless, costa, subcosta, and radius slightly greyish, and a black spot at the junction of the subcosta and great cross-vein.

♀.—Wings yellowish, with faint fuscous shading. Venation fuscous. Body in both sexes ochraceous.

Imago ♂.—Head and eyes light reddish brown. Thorax above yellowish brown, paler centrally; sides and beneath yellowish. Legs yellowish brown, apices of femora brownish. Relative lengths of anterior tarsal segments 8 : 14 : 10 : 5 : 5, of posterior tarsus 10 : 9 : 7 : 5 : 12. Abdomen yellowish, with a median dorsal stripe of reddish brown on segments 1-9, occupying about one-half of the width of each segment. Within this stripe,

there is on segment 2 a pair of right-angled triangular yellow spots, and on segments 3–8 a pair of reniform yellow spots. Setæ yellowish, becoming fuscous apically, joints of alternate segments slightly fuscous. Forceps and base yellowish. The latter with its apical margin expanded at the sides and raised and produced at its centre. Lobes of the penis, after treatment with KOH, slightly divergent, a little dilated towards their apices, and a wide U-shaped excision between them. No spines on the lobes. Penis with a constriction at the

Fig. 3.

*Cinygmina assamensis*, gen. et sp. n. ♂.

Genitalia from beneath.

point from which the lobes diverge. Wings hyaline, venation pale, almost colourless, except the part of the great cross-vein touching the subcosta, which is brown.

♀.—Similar in colouring, costal and subcostal areas of anterior wing faintly tinged with yellowish. Alternate joinings of setæ darker than in ♂.

Length of body, ♂ 8, ♀ 9; of anterior wing, ♂ 10, ♀ 13; of setæ, ♂ 23, ♀ 20 mm.

ASSAM : Khasi Hills (*Eaton Bequest*).

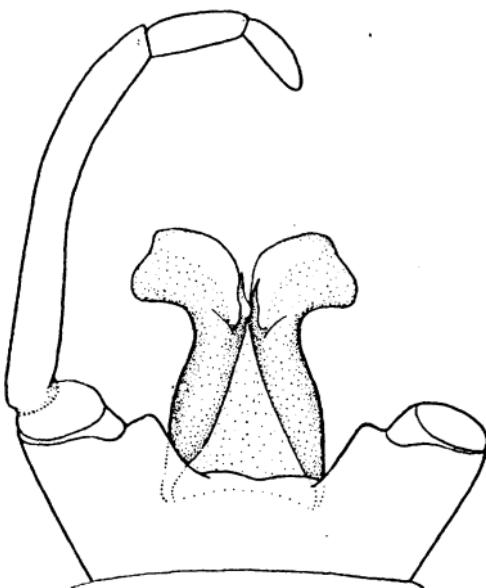
Type ♂, paratypes ♂ and ♀, imagines and subimagines in the British Museum collections.

Heptagenia nubila, sp. n. (Pl. XI. fig. 2; text-fig. 4.)

Subimago.—Wings greyish, venation dark brown, cross-veins heavily bordered with brown. Body black-brown, with yellowish markings.

Imago ♂.—Head yellowish brown, eyes black. Thorax above brownish or yellowish brown, sides brown, with yellow markings. Femora yellowish brown, with the apices and also two rings dark brown; anterior tibia and tarsus dull brownish; median and posterior tibiæ and tarsi dull yellowish. Relative lengths of anterior tarsal segments 3 : 19 : 18 : 13 : 6. Tarsus $1\frac{1}{2}$ times as

Fig. 4.

*Heptagenia nubila*, sp. n. ♂.

Genitalia from beneath.

long as tibia. Posterior tarsus with the first segment shorter than second. Abdominal segments 1–8 yellow above, apical and basal margins dark brown; these margins are much extended on segments 4–5. Segments 9–10 entirely brown above. Ventral segments yellowish, becoming fuscous on segments 8–9. Setæ dull yellow-brown, with darker annulations. Forceps and base pale fuscous. Apical margin of the forceps-base produced at the sides, leaving a wide excision at the centre. Segment 2 of the forceps constricted at its base. Lobes of the penis unarmed, apices dilated outwards and

somewhat truncate ; stimuli of medium size, situated on the median line. Wings hyaline, with brown markings fringing the cross-veins as in Pl. XI. fig. 2; venation brown. Hind wing more elongate than is usual in *Heptagenia*.

♀ similar, body markings more defined.

Length of body, ♂ and ♀, 8 ; of wing, ♂ $8\frac{1}{2}$, ♀ 10 mm.

ASSAM, Khasi Hills (*Eaton Bequest*).

Type ♂, paratypes ♂ and ♀, and subimagines in the British Museum collections.

Ecdyonurus eatoni, sp. n. (Pl. XI. fig. 3 ; text-fig. 5.)

Subimago.—Anterior wings (Pl. XI. fig. 3), fuscous, with three or four transverse pale streaks in the distal half, caused by pale areas in the centres of cells. Costal and subcostal areas (by transmitted light) yellowish, pterostigma dark fuscous. Venation dark brown. Hind wing fuscous, excepting costal and subcostal areas towards the base, which are yellowish. Body fuscous, legs marked as in imago.

Imago ♂.—Eyes black, thorax above shining dark castaneous. Legs yellowish brown, femora with a ring midway and the apices dark castaneous. Apices of anterior tibiæ also castaneous. Anterior tarsus about one and a quarter times as long as tibia. Proportions of anterior tarsal segments, 6 : 15 : 14 : 9 : $5\frac{1}{2}$. Abdominal tergite 1 reddish brown ; 2–6 ochreous, marked with rich reddish brown as follows :—Apical and basal margins ; a narrow median triangle, arising from the base and extending about three-quarters of the length of each tergite ; an oblique lateral stripe linking apical and basal margins ; and the apical lateral angles. On tergites 7–9 the reddish-brown marks are more extensive, and almost obliterate the pale ground. Tergite 10 ochraceous. Sternites pale ochraceous. Setæ fuscous, with darker joints to the segments. Forceps and base ochraceous. Forceps-base with a strong tooth on each side, margin between the teeth slightly produced. Penis-lobes rounded apically, somewhat as in *E. lateralis* Curt. Stimuli short and curved. Wings hyaline, with yellowish-brown venation, costal and subcostal areas of anterior wing yellowish, with a pale fuscous spot at base and apex of pterostigma. Posterior wing yellowish at base of costal area.

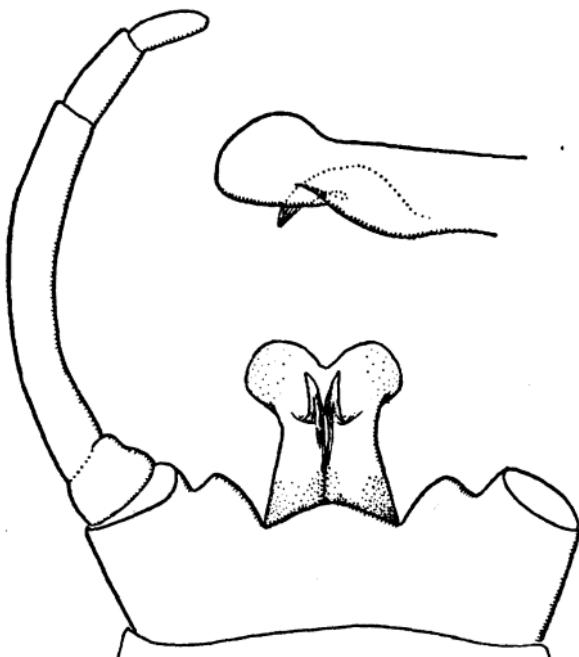
♀ *imago* similar, thorax paler, abdominal markings less distinct.

Length of body, ♂ 9, ♀ 9–11; of anterior wing, ♂ 11, ♀ 12–16; of setæ, ♂♀ 25 mm.

ASSAM, Khasi Hills (*Eaton Bequest*).

Type ♂ *imago*, and paratypes ♂ and ♀, imagines and subimagines, in the British Museum. Many of the specimens have suffered from the ravages of Psocids.

Fig. 5.



Ecdyonurus eatoni, sp. n. ♂.

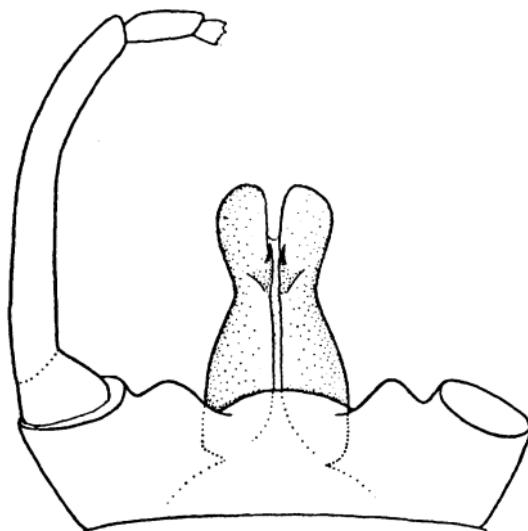
Genitalia from beneath, and penis-lobes, from side, more enlarged.

Ecdyonurus subfuscus, sp. n. (Fig. 6.)

Imago ♂.—Head dark brown, eyes black. Thorax above light brown, sides rather more yellowish. Femora yellow-brown, with their bases, apices, and a median ring on each, dark brown. Tibiae yellow-brown, with their extreme apices dark brown. Tarsi pale yellow-brown, apices of each segment darker. Anterior tarsus $1\frac{2}{3}$ times as long as tibia, relative lengths of tarsal segments 13 : 19 : 16 : 12 : 5. Abdomen pale yellow-brown, segments 2–8 above marked with dark purplish brown as

follows :—A narrow median dorsal stripe; the apical margin; the apical $\frac{2}{3}$ of the lateral margin; and an oblique lateral stripe rising from just above the anterior lateral angle towards the dorsal stripe. Setæ pale, with darker annulations on alternate joints. Forceps-base pale yellow-brown, forceps pale fuscous. Forceps-base toothed (text-fig. 6), terminal segment of forceps damaged in the type. Lobes of the penis obovate, more slender and elongate than in *E. lateralis* Curt., stimuli small and strong, down-curved. Wings hyaline, faintly suffused with yellowish brown, cross-veins in the

Fig. 6.

*Ecdyonurus subfuscus*, sp. n. ♂

Genitalia from beneath.

costal and subcostal areas, and between the radius and sector, bordered with brownish. Cross-veins in the pterostigma simple.

♀ similar in colouring, rather larger.

Length of body, ♂ 7, ♀ 8; of anterior wing, ♂ 8, ♀ 11 mm.
ASSAM, Khasi Hills (*Eaton Bequest*).

Type ♂, paratypes ♀♀ in the British Museum collections.

EXPLANATION OF PLATE XI.

Fig. 1. Ephemera zettana, sp. n. Wings of imago. $\times 4\cdot4$.

Fig. 2. Heptagenia nubila, sp. n. Wings of imago. $\times 10$.

Fig. 3. Ecdyonurus eatoni, sp. n. Wings of subimago. $\times 7$.

